Strategy Fading and Progress Feedback: Effects on Self-Efficacy and Comprehension Among Students Receiving Remedial Reading Services

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Abstract:

This experiment investigated the effects of strategy verbalization with fading and strategy value feedback on children's achievement outcomes. Children with reading-skill deficiencies received instruction on locating main ideas. Children were taught and verbalized a strategy; some faded the verbalizations to inner speech. Half of the children in the fading and no-fading conditions periodically received feedback that linked strategy use with improved performance. The no-fading/no-feedback condition scored significantly lower than the other three conditions on posttest self-efficacy, comprehension skill, and self-reported strategy use. Fading pius feedback led to higher reported strategy rise compared with the fading-only and feedback-only conditions and to higher comprehension skill compared with the feedback-only condition. These results support the idea that students receiving remedial reading services benefit from procedures that require extensive cognitive activity and that inform them about strategy usefulness. Research suggestions and implications of the results for educational practice are discussed.

Article:

Research and instruction in reading comprehension are increasingly stressing cognitive strategies--systematic plans for encoding information and performing tasks (Dole, Duffy, Roehler, & Pearson, 1991; Weinstein & Mayer, 1986). Strategies help students attend to tasks, focus on important material, rehearse and organize information to be remembered, monitor comprehension, and create and maintain a favorable psychological climate for learning (deBettencourt, 1987; Garner, 1990; Meyers, Lytle, Palladino, Devenpeck, & Green, 1990; Paris, Lipson, & Wixson, 1983). Teaching students to use comprehension strategies raises their performance, achievement beliefs, and awareness of the strategies' benefits (Brailsford, Snart, & Das, 1984; Oka & Paris, 1987; Stevens, 1988). Strategy instruction is especially beneficial for students with learning problems, who often do not work on tasks systematically (Paris & Wixson, 1986; Raphael & McKinney, 1983; Short & Ryan, 1984).

At the same time, strategy instruction does not always promote performance among students with reading problems and does not ensure that students will maintain strategy use over time and outside of the instructional setting (Borkowski, Johnston, & Reid, 1987; Ringel & Springer, 1980; Schunk & Rice, 1987, 1992). These negative results may occur because students do not adequately learn the strategy, do not realize that strategy use promotes achievement, doubt their ability to apply the strategy, or believe that the strategy is less important for success than other factors (e.g., time available, teacher assistance) (Baker & Brown, 1984; Borkowski, 1985; Borkowski, Carr, Rellinger, & Pressley, 1990; Garner, 1990).

Having students verbalize the strategy as they use it to comprehend material can enhance the benefits of instruction (Graham & Harris, 1989a; Schunk, 1986). Overt verbalization is a form of private speech--self. directed speech that is self-regulatory but not socially communicative (Berk, 1986; Fuson, 1979). Vygotsky (1962) believed that private speech helps develop thought through its role in behavioral self-regulation. From a

learning perspective, verbalization is a form of rehearsal that directs attention to important task features and helps organize, code, and store information in memory (Schunk, 1986, 1989). Verbalization also highlights the value of the strategy for improving performance. Students who believe they can apply a strategy that aids learning may experience a sense of personal control over learning and use the strategy systematically (Borkowski et al., 1987; Schunk, 1989). Verbalizing strategic steps during reading often promotes comprehension better than does using a strategy without verbalizing (Alexander & Hare, 1989; Chan, 1991; Schunk & Rice, 1985).

One problem with verbalization is that students may discontinue verbalizing (and using) the strategy when not required to do so. Schunk and Cox (1986) provided students classified as learning disabled with instruction on subtraction strategies. Some students verbalized aloud while solving problems (continuous verbalization), others verbalized aloud for the first half of the instructional program but not during the second half (discontinued verbalization), and students in a third condition did not verbalize aloud (no verbalization). Continuous verbalization led to the highest performance. It is possible that discontinued-verbalization students abandoned using the strategies when instructed to no longer verbalize aloud. They may have had difficulty internalizing the strategies; they may not have produced or used inner speech (covert instructions) to self-regulate their performances.

Vygotsky (1962) believed that overt verbalization represents the bridge between verbal control of a child's actions by external sources (e.g., parents) and subsequent self-regulation through inner speech. This suggests that the effects of strategy instruction can be enhanced by having students fade overt verbalizations to a covert level (Graham & Harris, 1989a; Meichenbaum, 1986). Meichenbaum's self-instructional training, for example, comprises modeling, guided practice, faded self-guidance (i.e., verbalizations faded to whispers), and covert self-instruction. This type of strategy internalization might facilitate strategy use among students with learning problems because such cognitive activity can lead to better strategy encoding, retention, and retrieval (Borkowski & Cavanaugh, 1979).

Fading may also enhance performance through its effect on self-efficacy--personal beliefs about one's capabilities to learn or perform skills at designated levels (Bandura, 1986, 1989). Self-efficacious students choose to engage in activities, expend effort to succeed, and persist when they encounter difficulties. Verbalization may raise efficacy because it can convey to students a sense of control over learning and a belief that they are capable of applying strategies to improve their performances (Schunk, 1986). Perceived control and self-efficacy are further enhanced to the extent that fading makes strategies easily accessible when students need to use them.

Despite the theoretical importance of fading, there is a lack of evidence on how its addition to strategy instruction affects the acquisition and maintenance of reading-comprehension skills and self-efficacy. Although studies found strategy instruction that includes fading verbalizations to covert self-instructions raises skills and self-efficacy among students with learning problems (Chan, 1991; Graham & Harris, 1989b, 1989c), the contribution of fading is unknown because the treatments used in these studies comprised many components.

In the present study, children with reading-skill deficiencies received strategy instruction on locating main ideas. All children verbalized the strategy; some students faded the strategy to a covert level. Self-efficacy, comprehension skill, and self-reported strategy use were measured before instruction and 2 weeks after the last session. Based on the preceding considerations, we predicted that the addition of fading would enhance children's achievement outcomes.

Another means of facilitating strategy-instruction effects may be to provide strategy-value feedback that links improved performance with strategy use (Borkowski, 1985; Borkowski et al., 1990; Paris, Wixson, & Palincsar, 1986; Ringel & Springer, 1980). Students will use a strategy when they believe it improves their work (Brown, Palincsar, & Armbruster, 1984). The belief that one can apply a strategy effectively can produce a sense of control over learning, which raises self-efficacy and motivates children to work systematically and to continue

using the strategy when no longer required (Bandura, 1986; Schunk, 1989). Strategy-value feedback seems especially beneficial for children with reading problems, many of whom do not understand that a strategy is useful, doubt their learning capabilities, and believe they have little control over outcomes (Butkowsky & Willows, 1980; Myers & Paris, 1978; Oka & Paris, 1987; Schunk & Rice, 1987, 1991, 1992).

Researchers stress that cognitive-skills instruction should include strategy instruction, practice in applying and monitoring strategy use, information on strategy value and the tasks for which the strategy is useful, and feedback to enhance students' perceived control over outcomes (Baker & Brown, 1984; Borkowski et al., 1987; Oka & Paris, 1987). Little research has explored whether students with reading problems benefit from multiple procedures that teach them to use strategies and provide them with information about a strategy's benefits and their capabilities to apply it (Schunk & Rice, 1987). Research has not explored the combined effects of strategy-value feedback and strategy instruction with fading. Such research will contribute to our knowledge of effective procedures to use with this student population and the processes underlying the effects of these procedures on learning.

In the present study, half of the children periodically received strategy-value feedback linking strategy use with improved performance. We predicted that strategy-value feedback would promote acquisition and maintenance of self-efficacy, comprehension skill, and strategy use. We also believed that combining fading with feedback would lead to higher outcomes compared with fading only and feedback only because the former represented the most complete set of influences on achievement outcomes. Fading was designed to help students internalize the strategy and improve self-regulation by making the strategy easily accessible, feedback was intended to provide information on strategy value, and both procedures were structured to enhance efficacy.

METHOD

Subjects

In consultation with school personnel we initially identified fifth-grade students (N = 52) from two elementary schools who regularly received remedial reading-comprehension instruction as part of the school district's Chapter 1 reading program. Students had been placed in remedial classes by the school district because they scored at or below the 30th percentile (roughly equivalent to Grade 3) on the reading subtest of the SRA Survey of Basic Skills (Science Research Associates, 1985). Teachers nominated students who they believed would not experience excessive decoding problems while receiving comprehension instruction. We limited the sample in this fashion because the experiment focused on comprehension, and decoding difficulties could mask the effects of the treatments.

The final sample comprised 44 students. Five of the original 52 were dropped because they had difficulty understanding the experimental instructions and 3 were randomly excluded from the appropriate conditions to equalize sizes. The 16 boys and 28 girls ranged in age from 10 years, 1 month to 11 years, 6 months (M = 10 years, 8 months, SD = 3.5 months). Although different socioeconomic backgrounds were represented, children predominantly were lower-middle class. Ethnic composition of the sample was: 24 (55%) Hispanic, 11 (25%) white, 8 (18%) African American, 1 (2%) Asian. About half of the students were in their first year of enrollment in the remedial program; the remainder were in their second or third year. One quarter received some instruction in English-as-a-Second-Language (ESL) classes. These children were close to transition and subsequently were integrated into English language classes. Intelligence test scores were not available for the subjects. Although these scores would provide a more complete description of our sample, we believe that children were not intellectually disadvantaged and that their scores would fall in the normal range. Table 1 summarizes the subject characteristics by experimental condition.

We were concerned about children's English proficiency because poor comprehension of the experimental instructions would limit benefits of participation in the study and not provide a fair test of the hypotheses. The Chapter 1 teachers approved the original 52 students as understanding English well enough to participate in the study. Despite this assurance, we checked each child's comprehension with a brief interview and by periodically observing his or her participation in the sessions. As a result of these checks, we dropped five students because

of difficulties in understanding. Excluding these students and restricting our sample to students without excessive decoding problems limited generalizability of results but allowed for more meaningful interpretation. We believe that all students in the final sample understood English well enough to comprehend the experimental instructions.

Pretest

The pretest comprised measures of self-efficacy, comprehension skill, and self-reported strategy use. It was administered to children by one of two female adult testers from outside the school.

Self-Efficacy. The self-efficacy test assessed children's perceived capabilities for correctly answering different types of questions that tapped comprehension of main ideas. The efficacy scale ranged in 10-unit intervals from 10 (not sure) to 100 (really sure). The reading materials for the efficacy test included eight passages from Books A, B, and C of Scoring High in Reading (Cohen & Foreman, 1978). Passages ranged from 4 to 25 sentences, and each passage was followed by 1 to 4 questions (e.g., "What is the first paragraph mostly about?" "What is the most important idea in this passage?" "What does the passage talk mostly about?" "What is the narrator's main feeling?" "What is a good title for this passage?") for a total of 20 questions. Four passages (nine questions) were appropriate for Grade 2 students of average reading ability (Book A), two passages (six questions) for Grade 3 students (Book B), and two passages (five questions) for Grade 4 students (Book C). A sample efficacy passage and question from Book A is shown in the appendix.

A range of efficacy and skill passages was used, including some passages exceeding children's assessed reading levels, to provide variability in the measures and allow room for improvement. Had all pretest passages been at or below children's reading levels, efficacy and skill scores would have been high and there would have been little pretest-to-posttest change. This situation would have masked potential effects of experimental treatments. Efficacy passages and questions corresponded in reading level to those on the ensuing skill test, although they were not identical. Reliability of the efficacy measure was determined in prior research using children comparable in age and reading skills to those in the present study (Schunk & Rice, 1987). The test-retest reliability coefficient was .82.

Once children learned the meaning of the efficacy scale's direction and the different numerical values, they read aloud each of the eight test passages. After children read each passage, the tester read aloud its questions, one at a time. Children did not actually answer these questions. Rather, for each question, students privately judged their capability of correctly answering questions of that type (i.e., same format and level of difficulty) and not whether they could answer that particular question. To prevent students from actually answering the questions, we did not allow them to consult passages, questions did not appear on their test papers, and the tester read only the question, not its multiple-choice alternatives. Children marked the efficacy value that corresponded to how they felt. The 20 efficacy judgments were averaged.

Skill. The comprehension-skill test was administered immediately following the efficacy test and comprised eight passages with 20 questions. Passages and questions were drawn from Cohen and Foreman (1978), were identical in format to efficacy passages and questions, and ranged in difficulty as described previously. We also checked the skill passages to ensure correspondence in readability to the efficacy passages. The tester presented children with each passage, with the accompanying one or more multiple-choice questions, one at a time. After children read each passage aloud, they answered its questions. Comprehension skill was evaluated by the number of questions answered correctly.

In this and the efficacy assessment, children received no assistance from the tester while they were reading and no feedback on the accuracy of their skill-test answers. Had we provided feedback or assistance, it might have raised scores and introduced an unwanted influence that would have clouded the effects of the treatments. We also provided children with no feedback on how well their efficacy judgments corresponded to their skill-test answers (i.e., whether they judged efficacy high for types of questions they answered correctly and low for

types they missed). Correspondence is an important issue in its own right, but it extends beyond the purpose of this study because we advanced no hypotheses about how it might be affected by treatments.
Self-Reported Strategy Use. This instrument, which measured children's self-reported use of the steps in the comprehension strategy, included five questions, each of which had a 10-unit scale ranging from 0 (not at all) to 100 (a whole lot). The scales were labeled: read the questions, read the passage, pay attention to keywords and details, reread and answer each question, reread passage when I cannot answer a question. The tester explained that students might take these actions to answer questions about passages they read. Children privately marked how often they typically performed each action while answering questions about passages. They were advised to be honest and mark the number that matched how they felt. Scores on the five scales were averaged. Internal consistency reliability was .78 (Cronbach's alpha).

Materials and Procedure

Children were assigned randomly within gender, ethnic background, and school, to one of four (n = 11) experimental conditions: fading only, feedback only, fading pius feedback, no fading or feedback. We made a few adjustments to this assignment to balance the four conditions for number of students enrolled in ESL classes and number in each year of the remedial program. All students received 35-minute instructional sessions on 12 days spread over 3 weeks, during which they worked on a packet of materials. Children assigned to the same condition met in small groups (five to six students per group, two groups per condition) with a female teacher from outside the school. Using only one teacher limited generalizability of results but eliminated potential effects due to different individuals implementing the treatments. The teacher was not informed of the purpose or hypotheses of the study. Groups met privately in classrooms; only one group was present in a room at a time.

The instructional packet consisted of several reading passages, each of which was followed by one or more multiple-choice questions tapping comprehension of main ideas. Passages were drawn from different sources and were similar to the test passages and to those typically used in children's remedial classes. Passages were ordered from least difficult to most difficult; 40% of the material was appropriate for a second-grade class of average reading ability, 40% for a third-grade class, and 20% for a fourth-grade class. Difficulty was varied through vocabulary and passage length. The material was carefully sequenced in the packet to ensure that children could successfully complete it. Children initially answered questions based on only a few sentences or short passages. Passage length increased until children were reading passages with several paragraphs. Although by the end of the last instructional session children were working on appropriate material for a fourth-grade level, approximately 90% of the material in the packet was at or below the children's reading level. The teacher reported that children did not experience difficulties with most of the packet's passages. During the experiment, children did not receive comprehension instruction in their classes.

The experimental procedure for all children during the first four instructional sessions was as follows. The teacher distributed the packet at the start of the first session. On a poster board was printed the five-step reading comprehension strategy (Schunk & Rice, 1987):

> What do I have to do? (1) Read the questions. (2) Read the passage to find out what it is mostly about. (3) Think about what the details have in common. (4) Think about what would make a good title. (5) Reread the story if I don't know the answer to a question. (p. 290)

After distributing the packet, the teacher pointed to the poster board and stated that they were going to use those steps to answer questions about what they read. The teacher then modeled the strategy and its application by stating, "What do I have to do? Read the questions." The teacher read aloud the multiple-choice questions for the first passage while children followed along, after which she pointed to and verbalized Steps 2 and 3. The teacher explained that details refer to bits of information and gave some examples, and said that while she was reading she would be thinking about what the details have in common. She then read the passage aloud. The teacher pointed to and verbalized Step 4 and explained that trying to think of a good title helps to remember important ideas in a story. She stated some of the details in the story, explained what they had in common, and

made up a title. The teacher then read aloud the first question and its multiple-choice answers, selected the correct answer, and explained her selection by referring to the passage. She answered the remaining questions in the same fashion.

Following this modeled demonstration, the teacher instructed children to repeat aloud each step after she verbalized it. She then said, "What do I have to do? Read the questions." After children verbalized these statements, she selected one student to read the questions aloud. When this child finished, the teacher instructed children to repeat after her Steps 2 and 3. The teacher then called on a different child to read the passage aloud. When students stumbled on a word, the teacher prompted with contextual and phonetic cues. After the child finished reading the passage, the teacher asked children to repeat Step 4 after her and selected another student to think of a title for the story and explain his or her answer. The teacher then called on individual children to read aloud each of the questions with its answers and to answer that question. If a child answered a question incorrectly, the student verbalized Step 5 and reread enough of the passage to answer the question correctly.

The instructional format for the remainder of the first session and the next three sessions was identical except that the teacher did not explicitly model the strategy. Instead, she called on children and had them verbalize and perform steps. This instructional procedure was substantially similar to what children typically received in their Chapter 1 classes. Although our instructional procedure was scripted to ensure standardized implementation, the teacher did not read the script but rather referred to it periodically to make sure she had covered the material. We followed this procedure so children would view the strategy as a useful technique for answering comprehension questions rather than as a procedure to be applied in a rote manner.

Despite this attempt to present the instruction in a nonmechanical way, we found that the format was repetitive nonetheless. To maintain children's attention, we employed short (35-minute) sessions and high-interest materials on such topics as animals, children, and explorations. We also included some narrative passages (about 10 % of the material) to further enhance interest. We observed each of the small groups for part of the instructional sessions twice a week over the 3 weeks (i.e., parts of half of the 12 sessions). These observations showed that the teacher implemented each treatment correctly and with enthusiasm and that students maintained interest. Although we did not formally assess students' task engagement, our observations and questioning of the teacher led us to believe that children in each condition spent comparable amounts of time academically engaged and that differences in achievement outcomes were not due to varying amounts of time on task.

Students assigned to the feedback-only and no-fading-or-feedback conditions continued to receive this instructional procedure during the remainder of the instructional program (Sessions 5 through 12). These students verbalized aloud the strategy's steps at the appropriate points prior to applying them to passages. Fading Procedure. At the start of the fifth instructional session the teacher told students assigned to the fading-plus-feedback and fading-only conditions the following: "We have been saying aloud each of these steps before we use them to help us read passages and answer questions. From now on we will whisper the steps to ourselves rather than saying them out loud."

The teacher initially demonstrated application of the predetermined fading procedure by following the preceding sequence except that instead of saying each step out loud, she whispered it just loud enough for children to hear it. Following the modeled demonstration, children were instructed to whisper each step to themselves just loud enough for the teacher to hear it. This procedure was followed for the rest of the fifth instructional session. During the sixth, seventh, and eighth sessions the procedure was identical except that the teacher did not explicitly model the whispering but, rather, called on individual children to whisper and perform the steps.

At the start of the ninth session the teacher told children that rather than whispering the steps they would begin saying the steps silently to themselves (subvocally): "We have been whispering aloud each of these steps before we used them to help us read passages and answer questions. From now on we will say the steps silently to ourselves rather than whispering them."

The teacher demonstrated application of this subvocal procedure by following the preceding procedure except that instead of whispering each step at the appropriate point, she said it subvocally and signaled students she was doing that (e.g., the teacher said to students, "Now I'm going to say Step 2 silently to myself," after which she said the step silently). Following this modeled demonstration, children were called on and verbalized each step silently at the appropriate time. This procedure was followed during the remainder of the ninth session and was similar during Sessions 10, 11, and 12, except that the teacher did not demonstrate it but instead reminded students to state each step silently before applying it.

Strategy-Value Feedback. Students assigned to the fading-plus-feedback and feedback-only conditions received strategy-value feedback linking their successes at answering comprehension questions with their proper application of the strategy. Each child received individual feedback three to four times during each instructional session. To ensure that feedback was credible, the teacher provided feedback after a child properly performed a step or answered a question correctly. Sample statements were "You got it right because you followed the steps in the right order." "Answering questions is easier when you follow these steps." "You've been answering a lot more questions correctly since you've been using these steps." "Do you see how thinking about what the details have in common helps you answer questions?" (Schunk & Rice, 1992).

Strategy-value feedback should not be confused with performance feedback concerning the accuracy of students' answers to questions (e.g., "That's correct." "That's a good idea."). All children received performance feedback, but only students assigned to the fading-plus-feedback or the feedback-only conditions received strategy-value feedback. Students assigned to the fading-only or the no-fading-or-feedback condition received only performance feedback at the appropriate points. Observations by the authors and the teacher's records indicated that strategy-value feedback was given properly and that all conditions received performance feedback equally.

Posttest

The posttest was administered 2 weeks following completion of the instructional program. This delay allowed us to assess maintenance of treatment effects on achievement outcomes. The tester, who had administered the pretest, was unaware of children's experimental assignments. The self-efficacy and strategy-use tests were identical to those of the pretest. A parallel form of the comprehension-skill pretest was used to eliminate potential effects due to passage familiarity. Reliability was assessed during prior research (Schunk & Rice, 1987); children's scores on these parallel forms correlated highly ($r = .87$).

RESULTS

Preliminary Analyses

To ensure that experimental conditions were comparable at the outset, we conducted preliminary analyses of variance (ANOVAs) on demographic and pretest variables; the four experimental conditions constituted the treatment factor. These analyses yielded no significant differences among the four conditions on ethnicity, $F(3,40) = 1.22$; school, $F(3,40) = .37$; gender, $F(3,40) = .24$; age, $F(3,40) = 1.57$; and SRA score, $F(3,40) = 1.95$. There also were no significant between-conditions differences in pretest self-efficacy, $F(3,40) = .43$; comprehension skill, $F(3,40) = .10$; and strategy use, $F(3,40) = .24$. Experimental conditions did not differ in the number of passages completed during the instructional sessions (between 80 and 90, $F(3,40) = 1.69$). Means and standard deviations of pretest and posttest measures by condition are presented in Table 2.

Posttest Analyses

We predicted that providing students with strategy fading or strategy-value feedback would raise self-efficacy, comprehension skill, and self-reported strategy use more than would strategy instruction without fading or feedback, and that the fading-plus-feedback treatment would raise these achievement outcomes better than fading or feedback alone. To test these hypotheses, we applied an ANOVA to each of the three posttest measures, using the four experimental conditions as the treatment factor.

Self-Efficacy. ANOVA yielded a significant treatment effect, $F(3,40) = 16.82$, $p < .001$, $MSe = 62.01$. Posttest means were evaluated with Dunn's multiple-comparison procedure (Kirk, 1982). These analyses showed that the fading-plus-feedback, fading-only, and feedback-only conditions judged efficacy higher than the no-fading-or-feedback condition (ps < .01); however, the hypothesis that the fading-plus-feedback condition would judge self-efficacy higher than the fading-only and feedback-only conditions was not supported.

Comprehension Skill. A significant effect due to treatment was obtained, $F(3,40) = 14.97$, $p < .001$, $MSe = 5.17$. The fading-plus-feedback, fading-only, and feedback-only conditions demonstrated higher skill compared with the no-fading-or-feedback condition (ps < .01, except $p < .05$ for the comparison of the feedback-only and the no-fading-or-feedback conditions). Fading-plus-feedback children demonstrated higher skill than did feedback-only students ($p < .05$), but the former did not differ significantly from the fading-only condition.

Self-Reported Strategy Use. ANOVA was significant, $F(3,40) = 16.81$, $p < .001$, $MSe = 119.46$. Analyses of posttest means supported the hypotheses. The fading-plus-feedback condition judged strategy use higher than the other three conditions (ps < .01) and the fading-only and feedback-only conditions reported greater strategy use than the no-fading-or-feedback condition (ps < .05).

Correlation/Regression Analyses

Correlational analyses were conducted to gain information on the relations between theoretically relevant variables. We predicted that SRA score, posttest self-efficacy, posttest skill, and posttest self-reported strategy use would be positively correlated. We felt that students with somewhat higher reading scores might perceive a greater usefulness of the strategy and attempt to employ it systematically, feel more efficacious about comprehending passages, and demonstrate higher skill. These predictions were partially supported. Self-efficacy was positively related to strategy use ($r = .44$, $p < .01$) and skill ($r = .85$, $p < .01$); strategy use and skill were positively related ($r = .36$, $p < .05$). SRA score was not significantly related to the other variables, possibly because subjects' scores were low and restricted in variability.

Using multiple regression, we also determined what portion of the variation in posttest skill was accounted for by the predictors of SRA score, pretest efficacy, pretest skill, pretest strategy use, experimental condition (as a categorical variable), posttest efficacy, and posttest strategy use. Predictors were entered one at a time in the preceding order (SPSS Inc., 1986). As shown in Table 3, significant predictors were experimental condition (51% of the variation, $p < .01$), posttest efficacy (23%, $p < .01$), and posttest strategy use (3%, $p < .05$). Collectively, all seven predictors accounted for 81% of the variation in skill (R2 adjusted = .778). We urge readers to view these findings with caution, because when multiple regression is used with a small sample, the regression coefficients tend to be unstable from one sample to another (Cohen & Cohen, 1983). The present use of multiple regression seems justified to explore the influences on reading achievement, but replication with a larger sample is needed.

DISCUSSION

The results of this study provide evidence of the effectiveness of multiple procedures designed for children with reading problems. Teaching students to use a comprehension strategy, having them verbalize the steps aloud and fade them to covert self-instructions, and periodically giving them feedback linking strategy use with improved performance enhanced self-efficacy, skill, and self-reported strategy use more than did strategy instruction with verbalization. Our combined treatment also raised skill and strategy use more than feedback alone and strategy use more than fading alone.

There is evidence that special student populations benefit from strategy instruction (Pressley et al., 1990), but little research concerning students with reading problems has explored the contributions of individual components of instructional procedures or the process underlying their effects. It is true that strategy-instructional treatments are complex and differ in many ways from comparison conditions, which makes it difficult to attribute effects to specific components (Pressley et al., 1990). The present study, which investigated the individual and combined effects of strategy instruction pius fading and strategy-value feedback during

reading comprehension, provides insight into effective procedures to use with students with reading problems and the process whereby these procedures may exert their effects.

The fading-plus-feedback treatment was comprehensive and included comprehension instruction, strategy training, a procedure for internalizing the strategy, and information about strategy usefulness. Collectively, these elements were designed to promote self-regulation of strategy use and raise perceived efficacy by conveying that students could control their learning and were capable of applying a strategy. The effects of the fading-plus-feedback treatment were not due to time on task because students in all conditions received the same amount of comprehension instruction and completed equivalent amounts of material. We believe that the success of the fading-plus-feedback treatment was due to the type of cognitive activity it required and the student beliefs it engendered.

Fading helps students internalize the strategy's self-regulating function (Meichenbaum, 1986). Such cognitive activity can lead to better strategy encoding, retention, and subsequent retrieval from memory (Borkowski & Cavanaugh, 1979). Students who know they can easily access and apply a strategy are apt to experience a sense of control over learning, which raises self-efficacy, motivation to apply the strategy, and learning (Bandura, 1986; Schunk, 1986). Strategy-value feedback informs students that the strategy is effective, they are making progress in learning, and they are capable of improving their skills (Schunk, 1989; Schunk & Rice, 1992). These beliefs are validated as students experience success. High self-efficacy, coupled with knowledge of how to use the strategy and the belief that it raises performance, motivates students to continue applying the strategy and produces strategy maintenance (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990). It is noteworthy that fading pius feedback produced the highest self-reported strategy use. Over a longer time, this strategy-use advantage could translate into higher self-efficacy and skill and into higher correlations of strategy use with efficacy and skill because as students use a strategy consistently, their skill and perceptions of their capabilities should improve.

We found that fading-only and feedback-only subjects scored higher than no-fading-or-feedback subjects on achievement outcomes. These findings conflict with results showing benefits of strategy instruction alone (Borkowski et al., 1987; Oka & Paris, 1987), but they are supported by prior research in which strategy instruction, with or without verbalization, did not raise outcomes in students with reading problems (Schunk & Rice, 1984, 1987, 1992). Such students benefit more from instructional procedures that require greater cognitive activity and convey in multiple ways that students are making progress in learning to apply a strategy that aids comprehension.

Although promising, the present results are limited in several ways. First, the subjects were poor readers. Strategy verbalization with fading seems especially beneficial for students with learning problems. Such students often do not work on tasks systematically, nor do they use inner speech to self-regulate their academic work (Harris, 1982; Paris & Wixson, 1986; Schunk, 1989). Strategy-value feedback seems similarly beneficial for poor readers, who may believe that academic successes are beyond their control, possess self-doubts about learning capabilities, and not understand that a strategy is useful (Butkowsky & Willows, 1980; Myers & Paris, 1978; Oka & Paris, 1987; Schunk, 1989). In contrast, better readers typically work on tasks strategically; use task-specific covert self-instructions to guide their performances; monitor their work and self-regulate strategy use, depending on task conditions; assess their progress and the effectiveness of strategies; and feel efficacious about performing well (Oka & Paris, 1987; Schunk, 1989). Although the present procedures might benefit better readers, these procedures are likely to have greater effects on remedial students.

Second, our intervention required that all subjects work on the same materials at the same pace, regardless of individual differences in learning rates or readiness for fading. Our fading procedure was predetermined in format and length of the components. This instructional format fit the purpose of the research and was similar to that typically used in subjects' Chapter 1 classes but is dissimilar in many ways to the highly individualized formats commonly found in special education settings. To improve generalizability, we recommend replicating this study with greater flexibility in the pace at which students complete materials and using a criterion-based

fading procedure reflecting students' individual capabilities to apply the strategy effectively. Some students might be able to move through the sequence quicker, whereas others might benefit from additional time on some phases; frequent performance assessments would determine readiness, and frequent efficacy assessments could gauge students' perceptions of their capabilities for progressing to the next phase.

Third, replication of this study with other content is needed. The fading and strategy-value feedback treatments were specifically designed for comprehension of main ideas. These treatments, along with the strategy, would need modification for other types of comprehension (e.g., drawing inferences, sequencing ideas) or reading skills (vocabulary, decoding). From a theoretical perspective, we would expect the same benefits from fading and feedback with other content, but replication is needed because the modifications to the strategy and treatments would be extensive.

Fourth, future research should include a measure of students' actual strategy use in addition to self-reported use. There is evidence that self-report measures generally represent students' beliefs accurately (Assor & Connell, 1992), and previous similar research obtained positive correlations between students' actual and self-reported use of a strategy (Schunk & Rice, 1992). Research exploring this relation in the context of fading is needed to determine whether students' self-reports match their actual use of an internalized strategy.

Finally, future research might explore the long-term effects of procedures designed to enhance achievement outcomes. Our posttest was actually a maintenance test because it was given 2 weeks after the end of instruction, although this is not a long maintenance period. Reading-comprehension research using a similar methodology has obtained evidence for maintenance of strategy use and skills across settings (Chan, 1991) and time (6 weeks after the posttest, Schunk & Rice, 1992). Research in other content domains employing strategy instruction with fading has yielded evidence for maintenance of skill gains up to 12 weeks following training (Graham & Harris, 1989b, 1989c). To explore maintenance of achievement outcomes in depth, researchers might periodically assess students' self-efficacy and skills, as well as have them verbalize aloud while they read and answer questions about material. Such a think-aloud procedure could determine the relationship between strategy use and changes in self-efficacy and skill.

We believe that our results have some applicability to many students who receive special education services, although replication of this study with other special student populations is needed. For example, students with learning disabilities display characteristics similar to those in our sample of students with reading deficiencies. Students with learning disabilities often do not work on tasks strategically (Hallahan, Kneedler, & Lloyd, 1983) and hold low perceptions of learning capabilities (Chapman, 1988; Schunk, 1990). Such students can be taught to use learning strategies and show improved performance (Pressley et al., 1990), but they often do not recognize the value of strategies for improving performance, discontinue applying strategies when not required to use them, do not use strategies outside of training contexts, and do not internalize strategies so they can apply them when needed (Borkowski et al., 1987; Oka & Paris, 1987; Paris, Jacobs, & Cross, 1987; Schunk & Cox, 1986).

The present procedures were designed to address these problems. Our instructional format was a form of self-instructional training (Meichenbaum & Asarnow, 1979). Self-instructional training is an interactive means for teaching a strategy and helping students internalize it (Harris, 1982). Self-instructional training can help remedy academic deficits among students with learning disabilities (Alexander & Hare, 1989; Leon & Pepe, 1983; Swanson & Scarpati, 1984). Self-instructional training also can raise students' self-efficacy; the fading component is especially important because it helps students convert overt verbalizations into inner speech and it shows students that they can readily access and apply a strategy that helps improve their comprehension (Schunk, 1986). Strategy-value feedback can raise skills and self-efficacy, and other evidence shows that providing information about a strategy's benefits to students with learning disabilities raises strategy use (Paris et al., 1987).

There are other multicomponent, interactive procedures that are similarly beneficial for students with reading problems. A popular procedure is reciprocal teaching (Palincsar & Brown, 1984). Working with seventh graders with poor comprehension skills, Palincsar and Brown trained students in self-directed summarizing, questioning, clarifying, and predicting. A teacher met with a small group of students and initially modeled the strategies, after which students took turns being the teacher, with assistance from the teacher as needed. Palincsar and Brown found that reciprocal teaching led to better comprehension, maintenance, and generalization, compared with more-traditional instruction. Future research might examine the relative value that strategy fading and strategy-value feedback have in reciprocal teaching as a means of further testing the generality of these procedures.

The present results support the idea that self-efficacy is not merely a reflection of prior performances (Bandura, 1986). Experimental conditions did not differ in the number of passages completed during instruction, but children who received fading or strategy-value feedback subsequently judged self-efficacy higher. This study also shows that self-efficacy helps to predict skillful performance. Personal expectations for success are viewed as important influences on achievement by different theoretical approaches (Bandura, 1989; Covington, 1987; Weiner, 1985).

Despite this study's limitations and the need for additional research, these results have implications for teaching. Our subjects apparently internalized and used a reading-comprehension strategy to regulate their performances. Our strategy-fading and strategy-value feedback treatments can be incorporated easily into comprehension instruction for students with reading problems in various settings (resource rooms, self-contained classes, regular classes). We recommend use of these procedures as a way to foster students' self-regulated strategy use, self-efficacy, and skills.

TABLE 1
SUBJECT CHARACTERISTICS
Legend for Chart:

A - Characteristic
B - Experimental condition--Fading only
C - Experimental condition--Feedback only
D - Experimental condition--Fading plus feedback
E - Experimental condition--No fading or feedback

A	B	C	D	E
Age				
M (years)	10.7	10.4	10.8	10.8
SD	0.3	0.3	0.4	0.3
Gender				
Male	4	4	5	3
Female	7	7	6	8
Ethnicity				
Hispanic	7	5	6	6
White	1	4	3	3
African American	2	2	2	2
Asian	1	0	0	0
SRA Reading Score				

M (stanine)	3.1	3.3	3.5	3.7
SD	0.7	0.6	0.7	0.6
ESL status				
Enrolled	3	3	3	2
Not enrolled	8	8	8	9
Years in remedial program				
First	5	6	7	6
Second	4	4	3	3
Third	2	1	1	2

Note. N = 44; n = 11 per condition.

TABLE 2

MEANS (AND STANDARD DEVIATIONS) OF PRETEST AND POSTTEST MEASURES

Legend for Chart:

A - Measure
B - Phase
C - Experimental condition--Fading only
D - Experimental condition--Feedback only
E - Experimental condition--Fading plus feedback
F - Experimental condition--No fading or feedback

A	B	C	D	E	F
Self-efficacy					
	Pretest	58.3 (12.1)	59.5 (10.6)	57.9 (13.5)	53.8 (13.3)
	Posttest	81.4 (7.3)	79.2 (8.4)	85.4 (5.3)	63.2 (9.7)
Skill					
	Pretest	5.6 (1.4)	5.4 (1.2)	5.8 (1.5)	5.5 (3.2)
	Posttest	12.1 (2.6)	10.0 (1.9)	13.1 (2.4)	7.1 (2.1)
Strategy use					
	Pretest	51.5 (10.8)	50.9 (16.0)	54.4 (16.3)	49.3 (13.3)
	Posttest	68.4 (15.5)	69.1 (9.3)	87.6 (7.8)	54.7 (9.5)

Note. Self-efficacy means represent the average judgment per question; range of scale is 10 (low) to 100. Skill means represent the number of correct answers out of 20 questions. Strategy use score is the mean of the five steps; range is 0 (low) to 100.

TABLE 3

REGRESSION ANALYSIS OF PREDICTORS OF POSTTEST COMPREHENSION SKILL

Legend for Chart:

A - Predictor
B - R2 cumulative
C - R2 adjusted
D - R2 change
E - df
F - F

A	B	C	D	E	F
SRA score	.0004	-.0235	.0004	1	.01
Pretest self-efficacy	.0044	-.0442	.0040	1	.16
Pretest skill	.0247	-.0485	.0203	1	.83
Pretest strategy use	.0480	-.0497	.0233	1	.95
Experimental condition	.5603	.5024	.5123	1	44.28[b]
Posttest self-efficacy	.7893	.7551	.2290	1	40.22[b]
Posttest strategy use	.8144	.7784	.0251	1	4.88[a]
Residual	.1856	.2216	--	36	--

a p < .05. b p < .01.

APPENDIX: Sample Self-Efficacy Passage and Question

The gorilla's life is not always quiet. Sometimes the father gorilla does a very strange thing. In a way it is a kind of dance. First he makes a soft hooting noise. Then he picks a leaf and holds it in his lips. He stands up high on his back legs. He hoots faster. He throws leaves in the air. He hits his great chest so hard the noise can be heard far away. He kicks one leg in the air. He runs sideways. He rips leaves and branches off trees. Then, to end it all, he hits the ground with his mighty hand.

What is this passage mainly about?

A. How the father gorilla rips up trees.
B. A strange dance of the father gorilla.
C. The life of the father gorilla.
D. How a father gorilla makes a hooting noise.

Note. During the efficacy assessment, the question was read without its multiple-choice alternatives.

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